

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
18 March 2004 (18.03.2004)

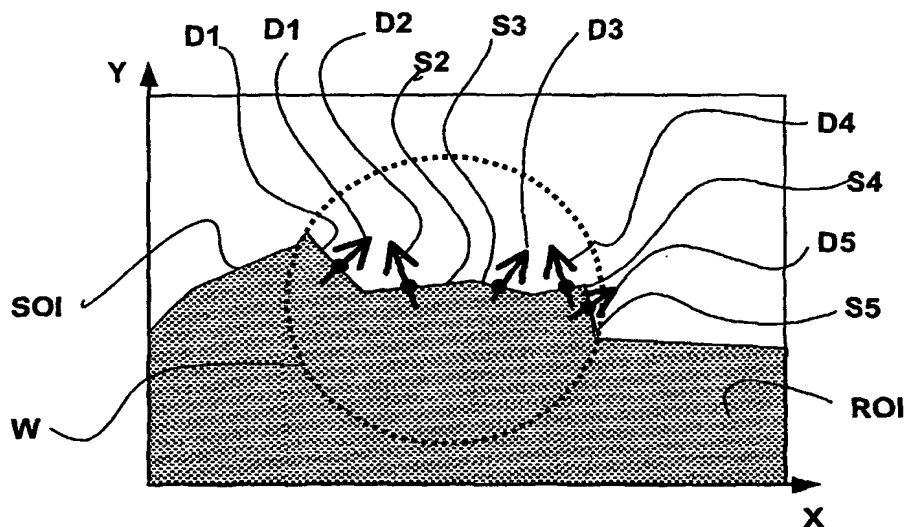
PCT

(10) International Publication Number  
**WO 2004/023396 A3**

- (51) International Patent Classification<sup>7</sup>: **G06T 5/00, 9/20** (74) Agent: **LOTTIN, Claudine**; Société Civile SPID, 156 Boulevard Haussmann, F-75008 Paris (FR).
- (21) International Application Number: **PCT/IB2003/003775** (61) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date: 22 August 2003 (22.08.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
02292175.3 4 September 2002 (04.09.2002) EP (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant (*for all designated States except US*): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **MAKRAM-EBEID, Shérif** [FR/FR]; 156 Boulevard Haussmann, F-75008 Paris (FR). **ROUET, Jean-Michel** [FR/FR]; 156 Boulevard Haussmann, F-75008 Paris (FR). **FRADKIN, Maxim** [FR/FR]; 156 Boulevard Haussmann, F-75008 Paris (FR).
- Published:  
— with international search report
- (88) Date of publication of the international search report:  
1 July 2004

[Continued on next page]

(54) Title: CHARACTERIZING, CODING AND COMPARING SURFACES, CONTOURS OR BOUNDARIES IN MEDICAL IMAGING



(57) Abstract: The invention relates to a medical image processing system comprising means for identifying a boundary of the object, and reference points of said object boundary and for decomposing said object boundary into boundary unit elements, centred at the reference points, means for coding each reference point including spatial information and intensity information using dipoles or magnetic moments; computing transform coefficients from said coding data. A finite number of said coefficients is used for representing said object boundary by a polynomial transform function (e.g. Hermite polynomials). This system has means for comparing, matching, correlating, smoothing corresponding boundary portions of the object in different images, only by performing operations on the transform coefficients. These operations yield rotation, translation, scale change transform coefficients.

**WO 2004/023396 A3**



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 03/03775

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G06T5/00 G06T9/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06T G06F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 6 078 680 A (KATSURAGAWA SHIGEHICO ET AL) 20 June 2000 (2000-06-20) column 3, line 43 -column 4, line 33 column 10, line 13 - line 49 column 13, line 14 -column 14, line 39 column 14, line 50 -column 15, line 5 column 15, line 26 - line 37 column 16, line 30 - line 67 figures 1,4 --- -/--	1,2,6-14 3-5

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the International filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the International filing date but later than the priority date claimed

"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the International search

5 March 2004

Date of mailing of the International search report

29/03/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Ellerbrock, T

# INTERNATIONAL SEARCH REPORT

Intel ☐ onal Application No  
PCT/IB 03/03775

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FANGWEI ZHAO ET AL: "Contour extraction in prostate ultrasound images using the wavelet transform and snakes" PROCEEDINGS OF THE 23RD. ANNUAL INTERNATIONAL CONFERENCE OF THE IEEE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY. 2001 CONFERENCE PROCEEDINGS. (EMBS). INSTANBUL, TURKEY, OCT. 25 - 28, 2001, ANNUAL INTERNATIONAL CONFERENCE OF THE IEEE ENGINEERING IN M, vol. 1 OF 4. CONF. 23, 25 October 2001 (2001-10-25), pages 2641-2644, XP010592201 ISBN: 0-7803-7211-5	1,2,6-14
A	abstract  page 2642, right-hand column page 2643, section "C. Snakes" figures 2C,3,5	3-5
A	ARBTER K ET AL: "APPLICATION OF AFFINE-INVARIANT FOURIER DESCRIPTORS TO RECOGNITION OF 3-D OBJECTS" IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE INC. NEW YORK, US, vol. 12, no. 7, 1 July 1990 (1990-07-01), pages 640-647, XP000136963 ISSN: 0162-8828 page 642 page 644, section "A. Clustering ..."	7-11,14
A	CHUN-KSIUNG CHUANG ET AL: "A deformable wavelet descriptor and its application to curve extraction from noisy images" SIGNALS, SYSTEMS AND COMPUTERS, 1993. 1993 CONFERENCE RECORD OF THE TWENTY-SEVENTH ASIOMAR CONFERENCE ON PACIFIC GROVE, CA, USA 1-3 NOV. 1993, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, 1 November 1993 (1993-11-01), pages 11-15, XP010096287 ISBN: 0-8186-4120-7 page 12, section "2.2 Coordinate-Based.."	6
A	CHRISTIAN BLATTER: "Wavelets - Eine Einführung (Advanced Lectures in Mathematics)" 1998, VIEWEG & SOHN, BRAUNSCHWEIG XP002272581 page 164 -page 169  --- -/--	1

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 03/03775

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>KUBOTA T. AND HUNTSBERGER T.: "Edge Dipole and Edge Field for Boundary Detection"</p> <p>PART OF THE SPIE CONFERENCE ON HYBRID IMAGE AND SIGNAL PROCESSING VI, vol. 3389, 1998, pages 179-189, XP002272580</p> <p>Orlando, Florida, US</p> <p>abstract</p> <p>-----</p>	3

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 03/03775

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6078680	A	20-06-2000	AU WO	8509998 A 9905639 A1	16-02-1999 04-02-1999